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WARD'S DYNAMIC SOCIOLOGY.

III.

MR. WARD presents a classification of the sciences differing from those proposed by August Comte and Herbert Spencer. The new classification is of great interest, and deserves especial mention. The classification of Comte was made prior to the great development of modern scientific research, and is imperfect. The classification of Spencer is, like much of his philosophy, a mixture of metaphysical speculation and positive knowledge. Does the classification of Ward meet the requirements of scientific philosophy?

He divides the subject-matter of all science into three parts, which he denominates the 'primary,' 'secondary,' and 'tertiary' aggregations. It is a classification of the objects of the cosmos by modes of aggregation. The primary aggregation is molecular, and gives an inorganic kingdom; the secondary is morphologic, and gives a biologic kingdom; the tertiary is sociologic, and is represented by human society.

A mountain is an aggregation of rocks, or geological formations, some of which may be crystalline, others detrital. It is an inorganic molar aggregate, and must fall into Mr. Ward's first class. But the earth itself is an aggregate of solids, fluids, and gases. Its solids are molar aggregates of detrital and crystalline rocks. These rocks at the surface are arranged in mountains, hills, and valleys, with intervening depressions filled with bodies of water, — seas, lakes, and rivers; and beneath, an unknown interior; and above, the atmosphere. The atmosphere is in motion. The water is carried into the air, and moves with it, and descends again upon the earth. The known solid portion of the earth is also in motion, rising and falling in its relation to the centre of the earth; while portions of the unknown interior of the earth are, by extravasation, coming to the surface, and the land portions of the earth are being carried by the waters into the sea.

Geology teaches us, then, that the earth is composed of interdependent parts; that the circulation of the air, of the waters, of the solids, and of the interior liquids is carried on by the action of the several interdependent parts; and the earth has been not inaptly compared by eminent geologists to a living or organized being. If we properly understand Mr. Ward, this aggregation also is to be relegated to his first class.

Again: the earth is one of a group of worlds composing the solar system, — the solar aggrega-

tion, composed of interdependent parts; and this aggregation is also to be included in the first class.

The inclusion of all of these modes of aggregation in the one class is tacit. He does not clearly set them forth, and his definitions are imperfect. It is difficult to understand from his discussion whether they were considered in his general scheme, or whether he would, if considering them, establish one or two more grand categories.

Again: psychology is included in the secondary aggregation as belonging to biology. As the term is now used by scientific men, 'psychology' includes a consideration of the biologic organ of the mind and its operations. Through these operations are produced languages, giving the science of philology; arts, giving the science of technology; societies, giving the science of sociology; and opinions, giving the science of philosophy. With Mr. Ward, philology, technology, and perhaps philosophy, are subordinate parts of sociology. Though he does not make direct statement to this effect, yet his presentation leads to this conclusion, in the same manner as his presentation of the subject of primary aggregation leads to the supposition that he intends to include molar and stellar aggregations therein.

Psychology has its biologic organ in the brain and nervous system; and mind is discovered in the lower orders of life, as well as in man. The genesis of psychology is manifestly in biology. In like manner, the organs of speech, active and passive, alike in oral, sign, and written language, are biologic; and language is also found in the lower orders of life. Language, therefore, has its genesis in biology. In the same manner, the organs of the arts are biologic; and rude arts are discovered in the lower orders of life. Technology, therefore, has its genesis in biology. The first step in sociologic organization is the biologic differentiation of the sexes, giving husband and wife, parent and child; and rude social organization is also found in the lower orders of life. Sociology, therefore, has its genesis in biology. The same considerations that would lead to the relegation of psychology to biology would also lead to the inclusion of philology, technology, and sociology, and perhaps of philosophy.

Now, these five sciences are so bound together that the absence of one would void all. They are interdependent and co-ordinate in such a manner that the evolution of one is dependent on the evolution of all. Language is a means of communication between individ-

ual minds. Discrete minds could not develop language: it is produced by many co-existing individuals of each of a long series of generations. Society and mind were necessary to its production. The arts are produced by many persons in the same manner as languages, and involve also the operations of mind; but the arts could not have been developed without the concomitant development of language, for art is built on art, and that which remains in art must pass from person to person and from generation to generation by means of language. The arts of absolutely discrete men could make no progress.

For the evolution of society, language is necessary for the intercommunication of thought. The interdependence of men as integral parts of bodies politic would be impossible without language; and sociologic organization is dependent upon the differentiation of human activities, or the division of labor, and is therefore dependent upon the development of arts or technology. Philosophy, or the science of evolving opinion, is the final product of the mind, and is therefore dependent upon psychologic evolution. It is dependent upon philology, for language is the mould of thought, and determines its form. It is dependent upon technology, for by the arts men reach knowledge not otherwise attainable; and upon sociology, for it is the combined knowledge of many, accumulating through the generations.

Again: all that part of the evolution of psychology which distinguishes the human mind from that of the lower animals is due to the tertiary aggregation in the development of philology, technology, sociology, and philosophy. In philology the method of evolution is the survival of the economic in the struggle for expression; and the course of evolution is through the specialization of the grammatic processes, the differentiation of the parts of speech, and the integration of the sentence. The method of evolution in technology is the survival of the useful in the struggle to have; and the course of evolution is the employment of the forces and materials of nature for the benefit of mankind. The method of sociologic evolution is the survival of justice in the struggle for peace; and the course of evolution is the differentiation of the functions and organs of government, and the integration of tribes and nations. The method of evolution in philosophy is the survival of the true in the struggle to know; and the course of evolution is in the discernment and discrimination of phenomena, the

relegation from analogic to homologic categories in classification, and the discovery of more and more complex sequences. In these psychologic sciences the struggle, i.e., the endeavor, i.e., the conation, is teleologic.

The primary method of psychologic evolution is the survival of the fittest in the struggle for existence, and is purely biologic. The struggling subject itself survives. The secondary or indirect method of psychologic evolution is by the agencies of the philologic, technologic, sociologic, and philosophic methods; and, combined, they constitute the successful struggle for happiness. All that part of the evolution of psychology which separates man from the lower animals is due to this secondary or indirect method, and is teleologic; and progress is due, not to the survival of the fittest of the struggling subjects, but to the survival of the object for which the struggle is made. These five sciences, therefore, constitute one group, through the fact that they belong properly to the tertiary aggregation of matter, and the further fact that the method or cause of evolution exhibited therein is radically different from the method or cause of evolution in biology. The five sciences are co-ordinate, reciprocal, and interdependent. As biology has its genesis through protoplasm and organic chemistry in the physical aggregation, so these five sciences of the tertiary aggregation have their genesis in biology, — in the biologic organs of mankind, and the beginnings of these sciences discovered among the lower animals.

Elsewhere Mr. Ward classifies phenomena in the manner shown in the table on the following page, which is copied from his work.

Of the four groups thus derived, the first, inorganic, corresponds to the group embraced in his primary aggregation; the second, organic, to the group embraced in his secondary aggregation, but excludes psychology, philology, technology, sociology, and philosophy. If we combine his direct and indirect teleologic phenomena into one group, the five great sciences which include the operations and products of the mind are thrown into one. Let the first, then, be called *physical phenomena* or phenomena of the primary aggregation, and the sciences which pertain thereto physical sciences; the second, *biologic phenomena* or phenomena of the secondary aggregation, and the sciences pertaining thereto biologic sciences. But what shall the third group be called? If the term psychology is used, it must be with a wider connotation than that which it has heretofore had. Psychology.

Phenomena are :

Genetic; physical; unconscious: producing change through infinitesimal increments.

Inorganic:
the result of physical or mechanical forces.

Organic:
the result of vital or biological forces.

Teleological; psychical; conscious: proceeding from volition and involving purpose.

Direct:
proceeding according to the direct method of conation.

Indirect:
proceeding according to the indirect method of conation.

Zoölogical:
as manifested by creatures below man.

Anthropological:
as manifested by man. Domain of the social forces.

Natural:
taking place according to uniform laws, and produced by true natural forces; capable of prediction and modification.

Artificial:
consisting of natural phenomena modified by the inventive faculty.

then, would include the operations of the mind, and the products, or results, of those operations. If we use anthropology, the term will not include the beginnings of psychology, philology, technology, and sociology, found among the lower animals; for they have mind, language, art, and society in a comparatively low form. On the other hand, anthropology has been used so as to include the biology of man. If we use sociology, following Comte, Spencer, and Ward, the term must include more than these authors design, and some other term must be selected for that differentiated science which forms one of the group of five, and which above has been designated as sociology. Altogether it seems better to use the term *anthropology*, which would then include psychology, philology, technology, sociology, and philosophy.

Mr. Ward does not relegate ethics to any place in his scheme. Moral science relates to that portion of human conduct in which the qualities of right and wrong inhere; and the moral quality depends upon the relations which exist between men and men: it is therefore a part of sociology; and the principal body of ethics at any time existing among a people is formulated as law, made by the court or the legislature. Mr. Spencer, in his essay on the classification of the sciences, gives it no place, but, in the elaborate scheme of philosophy embraced in his works, places it above sociology.

It may be asked, What place does logic take in the classification here proposed? The reply is, that the logic of the ancients has no place in science. To modern logic something else has been added; and this something else belongs to psychology. The logic of the ancients, and a large part of that of modern metaphysicians, is a system designed to discover truth by a form of words. If it be

truthfully asserted that an object is white, no form of words can prove the truth of the assertion. If questioned, the questioner must perceive that the body is white in the same manner as it was perceived by the person making the assertion; and the assessor can only point out, i.e., demonstrate, the fact. And the same is true of any other fact, howsoever simple or complex. A truth or fact can be pointed out or demonstrated to the eye, or to the mind's eye, but cannot be proved by a logical form of statement. The idea of logical proof is a conception of a time when powers were occult; and logic divested of modern appurtenances is an occult art.

It would make this article too long to attempt to set forth fully the place of mathematics in this scheme; but quantitative relations, like qualitative relations, belong to all degrees of aggregations, to all complexities of phenomena, and to all stages of evolution; and, in the science of mathematics, relations of quantity are considered apart from other relations, and in the abstract.

Mr. Spencer, although he presents a classification of the sciences, does not use it in his philosophy of evolution, but practically uses the primary classification here set forth, under the terms 'inorganic,' 'organic,' and 'super-organic' evolution.

The defect in Mr. Ward's classification here pointed out seriously influences his presentation of the subject of dynamic sociology proper, appearing in the second volume. It also greatly narrows his view of the field of successful endeavor for organized society. Mankind has made progress, i.e., secured happiness, quite as much by the effort for peace and the establishment of justice as by the effort to know and the acquisition of truth. It can be shown in other and diverse ways that his view of successful human endeavor is

philosophically narrow; and he sometimes uses the epithets of the pessimist in a manner unworthy the philosopher.

FRUIT-INSECTS.

Insects injurious to fruits. Illustrated with 440 cuts. By WILLIAM SAUNDERS. Philadelphia, Lippincott, 1883. 436 p. 8°.

THE author has enjoyed exceptional advantages for the preparation of the work he has undertaken. Not only has he been acquainted with the work of economic entomologists through his own participation in it, and as editor of one of our principal entomological periodicals, but for twenty years past he has been an extensive fruit-grower as well. He is thus entirely familiar with what is wanted, and has produced a practical book of considerable value. Not that it contains much that is original or of novel presentment: it is rather a plain and judicious statement of what is known, but accessible to few because scattered in periodical literature. One is surprised at the size of the book when he sees that no effort is made to fill it out with unnecessary matter: rarely are half a dozen pages given to any one insect, and more than two hundred and fifty harmful insects are discussed.

The insects are treated under the head of the plants they affect and the parts of the plant they attack,—an excellent method, first used in this country by Fitch. They are described in brief, untechnical language, almost invariably figured, and often in several stages; and the account of their injuries is followed by a short statement of the best remedies, with illustrations of the parasites or other natural foes which keep the insects more or less in check. The plants which receive most attention are the apple (64 insects, 127 pages), the grape (52 insects, 75 pages), and the orange (26 insects, 45 pages). Next after these in importance are the plum, pear, the various currants, the raspberry, and the strawberry, followed at a little distance by the peach; a few pages each suffice for the cherry, quince, gooseberry, melon, cranberry, olive, and fig.

The illustrations are familiar friends to entomologists, almost all of them having already done abundant service; but they are none the less valuable for the purpose of this work; and the paper on which they are now printed permits to many of them a respectability they must rejoice to attain after long familiarity with the crude workmanship of the various government presses under which they have

been tortured. With a little more care in the printing, they would have shown at their best.

The only serious omission in the book is the absence of a systematic summary, or index, by which the insects of the same group attacking different plants should be brought together. This would the more readily serve to help the fruit-grower distinguish allied forms, and learn their different or similar habits. Such an index could have been so easily constructed, and would have occupied so little space, that its absence is the less excusable.

BREMIKER'S LOGARITHMIC TABLES.

Bremiker's Logarithmisch-trigonometrische tafeln mit sechs decimal-stellen. Neu bearbeitet von Dr. TH. ALBRECHT, professor and chief of section in the Royal Prussian geodetic institute. Tenth stereotype edition. Berlin, R. Stricker, 1883. 18+598 p. 8°.

BREMIKER's six-figure logarithms were first published in 1852 with a Latin text and title: *Nova tabula Berolinensis*, etc. In 1860 a German edition was printed. Both these editions were printed from movable types. In 1869 a stereotyped edition was printed, with some changes in the contents of the work. The editions of 1852 and 1860 contained a capital table of the sines and tangents of small arcs, which was omitted in the stereotype edition; and in this latter edition a table of addition and subtraction logarithms was introduced. The omission of the table of the functions of small arcs was hardly an improvement; and, in fact, this omission caused the early editions to command a higher price than the later stereotyped one.

The present edition by Dr. Albrecht combines the excellences of both the preceding editions. It contains the table of the logarithmic sines and logarithmic tangents of arcs up to 5° for each 1", and also includes the addition and subtraction tables.

The rest of the work is the same as the stereotype edition of 1869, except that four new pages of convenient constant logarithms are inserted, and that certain tables relating to units of weight and measure are omitted.

This collection of tables is a very practical and valuable addition to our present means of computation, and it will be welcomed as such. In the opinion of the writer, it is also the most satisfactory single collection of tables for students' use, although much can be said in favor of the best of the five-place tables for this purpose.

EDWARD S. HOLDEN.